Chicken Feet Flour (Gallus domesticus) Cookies for Osteoporosis Prevention

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ABSTRACT

Osteoporosis is the second most common public health problem after heart disease. Osteoporosis can occur in both women and men, but women four times more suffer from osteoporosis than men, besides that the incidence of early osteoporosis in women is also twice higher than men, this is related to the progressive decression function of the estrogen and lose bone density more quickly. For this reason, bone density invest need to be made. The peak time for bone development starts from the age of 18 years in women and 20 years in men. Low calcium intake in the long term causes a decrease in bone density which is a risk factor for osteoporosis. Consuming chicken feet flour (Gallus domesticus) cookies in 3 portions per serving per day as an alternative source of calcium can be a solution to prevent osteoporosis due to low calcium intake.

1. INTRODUCTION

Osteoporosis is a public health problem showed by low bone density, bone tissue damage, and disruption of bone microarchitecture, which can cause bone fragility and increase the risk of bone fractures (Sozen et al., 2017). Indicators of osteoporosis can include spinal cord injury or fracture and long-term ongoing back pain (Pusdatin, 2020). Osteoporosis is second ranked as the world's main health problem after heart disease (Cooper & Ferrari, 2019), with 200 million peoples sufferers because of osteoporosis in the world at 2009. The prevalence of osteoporosis in Indonesia was 10.3% of the total population of Indonesia at 2005. In addition, the prevalence of early osteoporosis in Indonesia is 41.7%, so that 2 out of 5 Indonesians are at risk of osteoporosis (Pusdatin, 2020).

Osteoporosis can occur in both women and men, but women four times more suffer from osteoporosis than men (Alswat, 2017). The incidence of osteoporosis is more striking in women because it is related to the progressive decression function of the estrogen hormone(Humaryanto & Syauqy, 2019), besides that women tend to lose bone density more quickly at a younger age, so that women have twice incidence of early osteoporosis than men (Alswat, 2017).

Long-term low calcium intake causes increased reduction in bone density, resulting in bone fragility and increased risk of fractures (Akkawi & Zmerly, 2018). Research conducted by Faizah and Fitranti (2015) shows that 76.2% of teenagers in the category do not consume enough calcium. The average calcium intake is only 559.05 mg per day or 55.9% of the AKG. Another study conducted by Prasetyo and Khoiriani (2021) using SKMI secondary data on women aged 19-49 years showed that calcium adequacy in 1000 kcal of energy consumed was still below FAO recommendations.

In research conducted by Faizah and Fitranti (2015), 90% of peak bone development occurs at the age of 18 years for women and starting from 20 years for men, so it is known that the peak of bone development occurs before the age of 30 years and it is the best time to invest bone density. A chicken feet flour (Gallus domesticus) cookies was used as a calcium source product that can be used as an alternative to prevent osteoporosis due to low calcium intake

2. METHODS

This research is a experimental research used 25 panelist semi trained, the panelists are nutrition diploma students who have taken organoleptic testing training. Organoleptic tests carried out aspects of taste, smell, color, texture and overall liking using the hedonic test method with scoring against three formulations, formulations A (10:90), B (20:80), and C (30:70). The scoring used is 1 (dislike very much), 2 (dislike), 3 (dislike somewhat), 4 (neutral), 5 (somewhat like), 6 (like), and 7 (like very much).

Meanwhile, calcium levels data was carried out by direct measurement using the Spectrophotometric method, protein data levels was carried out by direct measurement using the Kjeldahl method, and water content data was carried out by direct measurement using the Gravimetric method. Those data collected from most likely formula according to organoleptic tests.

The data obtained is in the form of primary data, the data is carefully collected one by one, then entered into a computer program to be processed and analysis. The data analysis used was frequency distribution calculations, Kolmogorov Smirnov test, Kruskal Wallis test and Post Hoc Mann Whitney test

3. FINDINGS AND DISCUSSION

Organoleptic tests were carried out aspects of taste, smell, color, texture and overall liking using the hedonic test method with scoring. The organoleptic test involved 25 semi trained panelists who were nutrition diploma students who had organoleptic test training. Organoleptic tests were carried out on three formulations, formulations A, B, and C.

Tabel 3.1 Data Distribution of Organoleptic Test Results for Chicken Feet Flour (Gallus domesticus) Cookies

Formulations	Taste	Smell	Color	Texture	Overall Liking
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
A	5,60 ± 1,00	5,52 ± 1,05	5,60 ± 0,91	5,64 ± 1,25[a]	5,68 ± 0,90
B	5,40 ± 1,00	5,28 ± 1,34	5,52 ± 1,00	5,68 ± 1,22[b]	5,20 ± 0,91
C	5,56 ± 1,16	5,32 ± 0,85	5,16 ± 1,14	4,24 ± 1,54[c]	5,32 ± 1,14
p[a]	0,003	0,003	0,001	0,002	0,001

[a]) (p > 0,05) Kolmogorov Smirnov Test

Based on normality testing using the Kolmogorov Smirnov test, the p-value is < 0,05 in all aspects of the organoleptic test, so it is stated that the organoleptic test results have an abnormal data distribution.

Tabel 3.2 Average Organoleptic Test Results for Chicken Feet Flour (Gallus domesticus) Cookies in Taste, Smell, Color, Texture and Overall Aspects

Formulations	Taste	Smell	Color	Texture	Overall Liking
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
A	5,60 ± 1,00	5,52 ± 1,05	5,60 ± 0,91	5,64 ± 1,25	5,68 ± 0,90
B	5,40 ± 1,00	5,28 ± 1,34	5,52 ± 1,00	5,68 ± 1,22	5,20 ± 0,91
C	5,56 ± 1,16	5,32 ± 0,85	5,16 ± 1,14	4,24 ± 1,54	5,32 ± 1,14
p^a	0,581	0,686	0,322	0,001*	0,188

*) There are significant differences

[a]) (p < 0,05) Kruskal Wallis Test

The organoleptic test results for the taste, smell, color and overall aspects have a p-value > 0,05, which indicates there is no average difference, while for the texture aspect, the p-value < 0,05, which indicates there is an average difference.

abel 3.3 Textural Aspects Differences in Formulations A, B, and C of Chicken Feet Flour (Gallus domesticus) Cookies

Aspects	Formulations		Difference	p^a
	A	B	0,04	0,944
Tekstur	A	C	-1,40	0,002*
	B	C	-1,44	0,001*

*) There are significant differences

[a]) (p < 0,05) Post Hoc Mann Whitney Test

From the results of the Post Hoc Mann Whitney test, it is known that there is a difference in the average preference for the texture aspect between formulations A, B and C, where the average preference for the texture aspect of formulation C is slightly lower than the average preference for the texture aspect of formulations A and B.

Testing of the nutritional content of cookies based on chicken feet flour (Gallus domesticus) cookies was carried out on one of the formulations, formulation A, because based on the aspects of taste, smell, color, texture and overall liking, it had consistent favorable scores. Nutrient content testing carried out includes calcium, protein and water content. Calcium content testing is carried out to prove that cookies are a suitable functional food product as a source of calcium, and testing for protein content and water content is carried out to prove that the quality requirements for cookies have been met.

Tabel 3.4 Nutritional Content of Formulation A Chicken Feet Flour (Gallus domesticus) Cookies

No	Nutrients/Portion	Amount
1.	Calcium	43,38 mg
2.	Protein	70,36 mg
3.	Water Content	3,85812 %

The calcium content of chicken feet flour (Gallus domesticus) cookies can fulfill 5% of the RDA calcium in the early adult age group if consumed 3 portions per serving per day with 3 pieces per serving and a net weight of 72 grams, so it can be an alternative source daily calcium according to ALG. Meanwhile, the protein and water content of chicken feet flour (Gallus domesticus) cookies are known to meet the quality requirements for cookies according to SNI (SNI 01-2973-1992).

Apart from that, formulation A is a functional food product. Functional food has three functions consisting of a primary function to fulfill the body's basic nutritional needs (carbohydrates, protein, fat, vitamins and minerals), a secondary function that is organoleptically acceptable, and a tertiary function, namely providing physiological benefits to help reduce the risk of disease in terms of this is osteoporosis (Fitri Wahyuni et al., 2023).

4. CONCLUSION

As an effort to prevent the incidence of osteoporosis, especially that caused by insufficient calcium intake, chicken feet flour (Gallus domesticus) cookies can be an alternative to suffice calcium adequacy, because chicken feet flour (Gallus domesticus) cookies already meet the requirements as a calcium source food product. Apart from that, chicken feet flour (Gallus domesticus) cookies can also be a functional food if specifically used as an additional food product to overcome disease.

In future research, it can be studied further regarding the effectiveness of consuming chicken feet flour (Gallus domesticus) cookies on the incidence of osteoporosis, or other beneficial values

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